



**Wisconsin Department of Natural Resources
Management Plan – Tier 3**

Property Name:

Forest Education and Awareness Center is the current name in the DNR database. The property has been officially renamed the Forest Exploration Center (FEC).

Property Designation or Type: Southern Forest

DNR Property Code Number: 9237

DNR Forestry Property Code: 4104

Property Location: *see MAP A for the Regional Locator Map*

COUNTY: Milwaukee

CITY: Wauwatosa

LEGAL DESCRIPTION: part of Section 20, Township 7 North, Range 21 East

Real Estate:

Fee acres owned: 66.9 acres

NRB approved acreage goal: 66.9 acres

Property Manager: Wisconsin Department of Natural Resources Division of Forestry, with the guidance of the Forest Exploration Center Board of Directors

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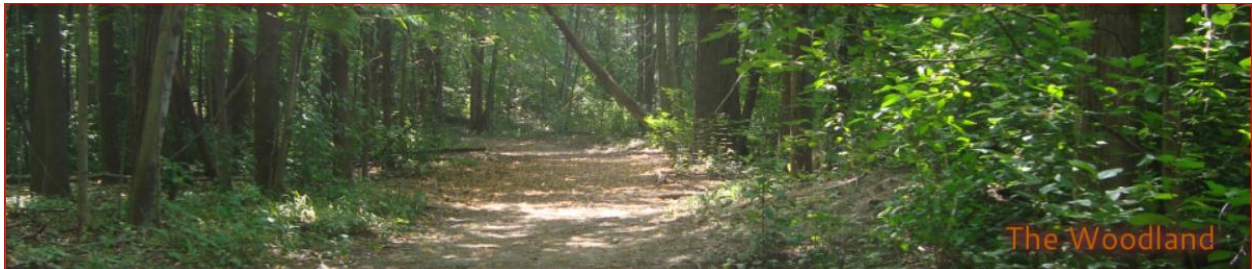


Photo courtesy of Forest Exploration Center website: <http://www.forestexplorationcenter.org/the-woodland.html>

Approved by Natural Resources Board: Date: _____ **August 9th, 2017** _____

A. Regional and Property Assessment

1. Special Partnership-Collaborating on the Overall Management of the Property

As a special note, this property is uniquely managed via a partnership of the Forest Exploration Center (FEC) Board and the Division of Forestry within the Department of Natural Resources (DNR). The FEC Board is comprised of 11 individuals, most of who are located within the local community or possess a strong interest in forestry awareness for our citizens. The FEC Board will work closely with appropriate DNR staff to develop 2-year work plans in order to understand and accomplish goals. Please visit the Forest Exploration Center website for more information, <http://www.forestexplorationcenter.org/>.

2. Landscape and Regional Context

This property falls in the Southern Lake Michigan Coastal Ecological Landscape which covers approximately 539,830 acres or 1% of the area of the state. Public land ownership is very low encompassing only about 1% of area within this ecological landscape. The other noteworthy component is that it is the most highly populated and heavily developed landscape in Wisconsin. Consequently, not much of the natural landscape is conserved as it is now developed for urban, industrial or agricultural uses. Forestland comprises about 12% or 64,779 acres of the Southern Lake Michigan Coastal ecological landscape. Forests in this landscape are almost all comprised of hardwood species, such as sugar maple and red oak. Most remaining forests are smaller parcels and consist of farm woodlots, parks and riparian corridors. This FEC woodland is rare (see 5b below) and should be maintained as forest. Lake Michigan is the dominant water feature for the area. To read more about ecological landscapes go to dnr.wi.gov and enter keyword LANDSCAPES.

3. Adjacent Land Uses

This property lies in a highly developed urban area, with many residential, commercial and recreation developments nearby. The property is bordered on the southwest by US Highway 45, on the south by Swan Boulevard and the UW-Milwaukee Innovation campus, on the west by the Wil-O-Way Community Center, and on the north and east by Underwood Parkway, the Hansen Park Golf Course and the Milwaukee Metropolitan Sewerage District (MMSD) floodwater detention basin. Also of note, the Milwaukee Medical Center is located about a mile to the southeast of the property. The latter is mentioned as it is an important consideration in the determination to not use prescribed fire as a management tool.

4. General Property Description, Management History and Use

4a. Management History and Use

The DNR purchased this property in 2005 from the County of Milwaukee. The property contains remnants or indicators of some of the historical uses. For example, people once worked the land. The land was used for grazing, for growing crops and as a tree nursery. Signs of these past uses are evidenced by the large-spreading crowns of several open grown trees, the partial remnant rows of nursery trees, and barbed wire fencing found protruding from trees, indicating fenced areas for grazing domesticated animals. It is likely some wood was utilized for firewood and perhaps some fence posts.

4b. Vegetation Overview

The parcel supports woodland vegetation on 60 acres of the total 67-acre parcel. The other 7 acres include remnant forest nursery areas, open grassy areas and a non-vegetated gravel area. The latter is currently being used for Department of Transportation (DOT) construction storage and road work. Based on data drawn from the U.S. GLO Public Land Survey of Wisconsin (1832-1866), the pre-settlement forest was a mix of oak and northern hardwood, which was modified by agricultural activities during the 19th and early 20th centuries. Today, the forested area is still comprised of this mixture of species. See MAP B-3 for general categories of land cover types. These areas are described in greater detail in section B of this document.

4c. Topography and Soils

The entire 60-acre wooded area is sited on Ozaukee silt loam soils with gently rolling upland terrain (2 to 12 percent slopes). Runoff is medium, and erosion is only a slight hazard. The forestry site quality is high for hardwood trees like red oak and sugar maple, and medium for coniferous trees like white pine and spruce. The site quality refers to the ability of the area to support the growth of the specified plant types. The non-wooded areas include some Ozaukee silt loam as well as Grays silt loam and Maritnen silt loam, with a very small amount of other loam soils. In general, the topography of the property consists of land with less than 3% slope.

4d. Water Resources

No navigable waterways are present on this property. Several small areas are delineated as wetlands that total less than one-half acre. A floodwater detention basin immediately adjacent to this parcel was developed and installed by MMSD. Periodic drainage (mostly after rain events or during spring runoff periods) flows from Swan Boulevard along the south edge of this parcel toward the MMSD basin. Several established drainage ways provide for surface water flow from Swan Boulevard onto the property. Proposals are developed to establish stormwater green infrastructure features, where feasible and practical, to improve water quality, to protect soil resources, to manage stormwater runoff from this parcel and to serve as educational and aesthetic resources. See the FEC Green Infrastructure Plan professionally developed collaboratively with the FEC Board noted in the reference section.

5. Forest Management Considerations and Forest Vegetation

5a. Property Features That Potentially Limit Forest Management

The ‘isolated’ nature of this woodland in a sea of urban development may preclude many forest management opportunities that would be considered ‘routine’ in more rural settings. The relatively small parcel size, the limited volume of the timber resource, and the distance to any other managed forested tracts of land potentially limit what forest management can be practiced here. Nonetheless, the property still may serve as an excellent outdoor classroom for students of all ages to experience the “woods”. Given the high human population density, forest education and awareness is one of the greatest opportunities this property offers.

5b. Property Features That Provide Unique Forest Management Opportunities

This property is a rare and unique remnant parcel of woodland in a highly developed urban area. As such, it serves as a popular hiking and respite area for local residents. It also provides an opportunity for

a hands-on forestry education experience that is accessible to a large number of schools, youth groups, local organizations and members of the general public. An urban audience may be less exposed to common forest management practices that maintain the health of forests and provide them with forest products for their daily use. The location of this parcel is ideally situated near a large population center to showcase these forest management practices and to highlight the ecology of a forest.

6. Endangered, Threatened, Special Concern Species or Habitats, and Wildlife Species of Greatest Conservation Need

6a. Endangered, Threatened, Special Concern Species or Habitats

The Natural Heritage Inventory (NHI) database is consulted to assist in assessing known occurrences of protected species. One of the tenets of using this database is to maintain confidentiality of exact species and species' locations. Consequently, a generalized description of results is provided below.

No federally threatened or endangered species occur on or immediately adjacent to this property. One state endangered bird has been identified as nesting near (but not on) this property. Historic documentation exists for two state endangered plants in this area, but neither plant has been documented as present in the past 70 years. One state threatened plant has been documented on adjacent public properties in recent years. Several state listed species of special concern exist: one plant, one crustacean and one fish, all of which have historic documentation, but no recent sightings on the property; two plant species have been documented recently on nearby properties; one dragonfly species was observed on an adjacent property; one snake species and one turtle species which have each been documented in this general area.

This table provides an overview of what is described above.

Table 1: Overview of NHI database search results. Historic=greater than 70 years ago.

	ENDANGERED		THREATENED		SPECIAL CONCERN	
	On the property	Adjacent or nearby property	On the property	Adjacent or nearby property	On the property	Adjacent or nearby property
FEDERAL	none	none	none	none	n/a	n/a
STATE	2-plants-historic	1-bird	None	1-plant	1-plant 1-crustacean 1-fish (all historic)	2-plants 1-dragonfly 1-snake 1-turtle

All management activities will be mitigated for the protection of these species when establishing management protocols, in order to protect them where they may still exist. Also, the NHI database will be re-consulted before any management or an activity is commenced.

6b. Wildlife Species of Greatest Conservation Need (SGCN)

The property lies in the Southern Lake Michigan Coastal Ecological Landscape (EL) as noted in section 2 above. The endangered, threatened and special concern species listed above are included in the list of SGCNs. The other SGCNs for the EL include two mammals, 35 birds, five herptiles and three fish. Many of the forest islands in the EL are often too small to truly support the breeding birds it may have had before human development dominated. The small parcels still serve as a haven for various species and stop over points for migrating species. For a complete list please see appendix 19. E of WDNR, 2015 in the reference section or go to dnr.wi.gov and enter keyword LANDSCAPES.

7. Cultural and Archaeological Features

No existing features are noted in current records (per Mark Dudzik, DNR State Archaeologist and State Historical Society Liaison, 4/2016).

8. Invasive Species

Invasive plant species are present in varying amounts across the property. Some of the notable invasive plants include shrubs like honeysuckle, buckthorn and Japanese barberry. Herbaceous invasive plants include garlic mustard. Other invasive species include the emerald ash borer (EAB) and Dutch elm disease. Any activities planned for the forest would seek to mitigate the spread of any of these invasive organisms. The active management to reduce or, if possible, control any specific invasive should be considered when conducting other activities on the property. Invasive species management is desired to maintain the integrity of the native forest ecosystem and as well as the non-forested areas of the property.

9. Public Uses and Infrastructure

One of the most frequent current and future uses of the property is hiking or walking on a plethora of trails. Unfortunately, over the years, the number of trails and access points has increased due to users choosing to forge new paths, which many other people have since followed. Consequently, there are an overabundance of trails given the size of this area (see Map B-1 in the appendix for the existing trails and 18 access points). The plan going forward is to limit both the number of trails and access points. Map B-2 in the appendix depicts the proposed trail system within the woods. The system will include both an accessible loop trail and a primitive loop trail. Reduced access points and trails will in turn reduce the spread of invasive plants and help focus the outreach or awareness efforts that will eventually be part of the walking experience. This approach also reduces the micro-fragmentation of the woods floor, creating higher quality habitat and space for woodland plants and fauna to thrive.

The FEC Green Infrastructure Plan (referenced earlier) depicts the concept of the main access road, parking areas, rest rooms and potential classroom and office structure (SmithGroupJJR, 2017). Having these elements in place will facilitate the desired learning lab for groups and individuals to come and learn more about the woodland. Visitors would learn about FEC's ecology, flora, fauna, management concepts and the products that are resultant from that management.

The property is well suited to providing a different perspective from the urban environment by which it is surrounded and to cultivating knowledge about all things related to woodlands-from plants, soils and wildlife, to the forest products we utilize every day.

10. Refuges and other Closed Areas

This property is not open to public hunting or public trapping.

11. Administrative Facilities

The goal for the property is to develop a place where an office may hold one to three staff affiliated with the property, a learning space or meeting room and restrooms. The concept for the road access, parking and building may be viewed in more detail by referring to the FEC Green Infrastructure Plan (SmithGroupJJR, 2017). Also see the proposed infrastructure map in the appendix, MAP B-2.

12. Significant Property Management Issues, Trends and Needs

This property has several management issues, trends and needs. The development and approval of this plan will help determine next steps and general priorities for approximately the next 15 years.

The relatively small size and urban location of this parcel, as well as the local recreational pressures, create challenges to the feasibility of traditional forest management practices. A balance between demonstration and preservation must be struck to achieve success. The DNR and the FEC Board are committed to working together to strike this balance, using a measured approach, in order to have all audiences understand the importance of forests and the practice of forestry.

The needs of the property are ultimately to create infrastructure and supply the human capital to support the goal of public awareness of forests, all of the forests' components and forest management. Given the potential to reach a large audience and explain the overall importance that forests play in Wisconsin's business, recreation and hunting economies, this small parcel has a potentially big impact on influencing the public's awareness of the forest resource and all it provides.

B. Property Purpose, Goals, Management Objectives and Management Activities

1. Property Purpose and Goals

1a. Management Purpose

The Forest Exploration Center will help foster a deeper understanding of forest ecology and sustainable forestry practices. The forest will provide a natural learning environment and a place for the community to understand and explore forest ecology and forest stewardship.

1b. Management Goals

Conserve, restore and maintain a hardwood forest and related ecosystem that reflects the environmental and ecological characteristics of southern Wisconsin.

2. Forest Vegetation Information and Proposed Management Activities

Please refer to MAP B-4 in the appendix to understand the area being referenced, for example, a "1" on the map corresponds to "Stand 1".

Terms you may need to know before reading about the stands and forest management. Another good reference for forestry terms can be found in Forest Management Guidelines at dnr.wi.gov and enter keywords FOREST GUIDELINES.

What is a "stand"?

On a map, foresters outline areas of land with similar vegetative and non-vegetative characteristics for management purposes into areas called "stands". This section describes these stands, each of which generally will be managed in an ecologically appropriate manner to meet conservation and education objectives.

What is a "northern hardwoods" mix of species?

Foresters group species of trees into various vegetation types. 'Northern hardwoods' refers to a mix of trees dominated by shade-tolerant species, namely sugar maple, basswood, beech, white ash, red maple - it may include smaller amounts of other species such as black cherry, red and white oak.

What does an "oak land cover type" description mean?

Foresters group species of trees into various vegetation types. Oak forests or stands refer to a mix of trees comprised of more than 50% oak species such as white oak, red oak, black oak, or bur oak. The same stand will often have lesser amounts of associated species such as sugar maple, red maple, hickory, green ash and several others. The actual mix of species in any stand is influenced by the soil type and management history.

What is a "seedling" versus a "sapling"?

Seedlings are trees that have a diameter ranging from greater than 0 inches to less than 1 inch. Saplings are trees that have a diameter ranging from 1 inch to less than 5 inches. Diameter is usually measured at "breast height" (dbh = diameter at breast height) which is 4.5 feet above the ground. Seedling heights are necessarily less than 4.5 feet.

Stand 1 Description: Large Diameter Oak Tree Forest with some Northern Hardwood Trees—20 acres

This 20-acre stand occupies the northwestern portion of the woods. The stand is dominated by large, old trees which form the overstory (high canopy). The dominant tree species include white and red oak and sugar maple. The mid-story layer which grows under the high canopy, but above the forest floor (ground or understory), includes tree species in a category called northern hardwoods. Northern hardwood species are adapted to grow in the shaded conditions which exist under the canopies of large, dominant trees. Northern hardwood tree species present in the understory and mid-story layers of this stand include sugar maple, white ash, basswood, bitternut hickory, ironwood and black cherry. The number of trees in these younger age and smaller size classes are currently inadequate to ensure that a continuous forest canopy can be maintained in the future.

The ground layer or understory (vegetation that is less than approximately 20 feet tall) is dominated by invasive shrubs, primarily honeysuckle and buckthorn, and less than optimal numbers of desirable tree seedlings and saplings. All tree species found in the overstory and mid-story are represented in the seedling and sapling categories EXCEPT for white and red oak. Oaks generally require full, or nearly full, sunlight to survive and grow. So, in the absence of a disturbance that provides more sunlight to the understory, oak seedlings and saplings eventually die out and disappear as natural succession favors shade-tolerant species.

Stand 2 Description: Large Diameter Northern Hardwoods Trees—9 acres

This relatively narrow 9-acre stand runs north and south and almost the entire length of the property. It has an overstory of large northern hardwood trees, especially white ash, sugar maple and red oak. Most of the overstory tree diameters in this stand tend to be smaller (less than 15 inches) than found in stand 1. The mid-story includes a mixture of hardwood tree species, including white ash, sugar maple, red oak, basswood, elm, white oak and black cherry. The understory layer is partially open, with moderate occurrence of shrubs, like invasive buckthorn, and less than optimal numbers of shade tolerant tree seedlings and saplings, mostly sugar maple and ironwood.

Stand 3 Description: Mixed Species Tree Plantation—9 acres

This 9-acre area is located on the southern end of the property adjacent to Swan Boulevard. The recent management that occurred has created a blank slate for a new forest to become established. Prior to the recent management, the stand had low numbers of hardwood poles*, saplings, and seedlings with almost no larger trees. Most notably, the stand was also infested with invasive brush, especially common buckthorn, honeysuckle and hawthorn. Ash and elm trees were the main tree species and were present in limited numbers. The lack of desirable tree species and regeneration (young trees) coupled with the density of invasive shrubs lead us to recommend that this stand be “started over”. During the fall and winter of 2015-16, dead and dying trees were salvaged and brush was cut and chipped using mechanical processes. Salvaged trees are utilized and made into various forest products.

*Poles or poletimber refers to trees with diameters (DBH) between 5 and 10 inches.

Stand 4 Description: Large Diameter Oak Trees—10 acres

Located in the southwest corner of the property, this 10-acre stand consists of many large, old trees creating an overstory dominated by white oak, red oak, sugar maple, and white ash. This stand has a higher oak component than stand 1 (70 percent in stand 4 versus 50 percent in stand 1). The mid-story is a diverse mix of white oak, sugar maple, red oak, white ash, black cherry, basswood, and elm. The number of trees in this size class is currently inadequate to ensure that they will form a closed canopy in the future. The ground layer has a very high occurrence of shrubs and a low numbers of tree seedlings and saplings. Tree species represented in the seedling and sapling categories include sugar maple, elm and ironwood.

Stand 5 Description: Scattered Hardwood Trees with a Grass Component—9 acres

This stand type occurs in three different areas on the property. Two of these areas are situated in the northern portion. The vegetation is a mix of hardwood trees with dense grassy ground layer. Part of the area was historically utilized as a fruit orchard. These areas have the potential to showcase different tree species via an arboretum-like planting.

Stand 6 Description: Planned Infrastructure and Access Area—10 acres

This stand encompasses the area in which planned infrastructure will be developed (see appendix MAP B-2). The infrastructure will eventually include parking for vehicles (including buses), restrooms, and an indoor classroom. The depictions on the map are conceptual and not confirmed. The infrastructure most needs to accommodate the planned goals of forest awareness. Part of this area is currently being used by the Department of Transportation (DOT) in exchange for road improvements once their project is completed.

Approved Management Actions for ALL STANDS

As stated above, the goal of the management of this property is to provide educational opportunities for a broad spectrum of visitors to better understand a forest ecosystem and the means by which we manage it. Any management activity will be accompanied by communication before, during and after a management activity has taken place. Specific activities will be presented to the FEC Board as part of the communication process. Forest management activities and projects will be implemented incrementally-starting with smaller areas and less intensive projects. All forest management activities will be conducted in accordance with sound silviculture practice as described in the DNR's Silviculture Handbook (HB24315.11). The list below provides a range of forest management activities targeted for this property but it is not all inclusive:

- Large tree removal should be focused and limited in scope. Initial activities will limit large tree removal to 1). Targeted areas where ash is dominant and where removal of ash prior to emerald ash borer (EAB) infestation will be beneficial, 2). Small, highly targeted areas where oak regeneration may be demonstrated using shelterwood techniques and 3). Selection salvage removal of large trees in response to windthrow or mortality, 4). Removal of high risk trees to address safety concerns, 5). Removal of minimal trees necessary to develop trails and other infrastructure.

- Demonstrate how various sized canopy openings provide opportunities for different tree species to regenerate and grow;
- Monitor the tree species that regenerate with varying amounts of sunlight in the canopy openings;
- Maintain or increase the diversity of tree species by selective thinning of regeneration (for example, removal of ash and ironwood saplings);
- Introduction of other species by planting tree seeds or seedlings;
- Conduct supplemental planting of seedlings and/or seeds to increase the oak component within the wooded stands that are dominated by oak;
- Salvage some to all trees damaged if the property is subjected to a natural disaster such as a wind event or a disease or insect infestation;
- Demonstrate the impact of emerald ash borer by leaving dominant ash trees in a portion of a stand (and perhaps use preventative treatments on some of the trees) and monitor the changes;
- Install deer exclosures – creating small deer exclosures throughout this property will help us understand, over time, the impact of white-tailed deer on the forest plant communities;
- Demonstrate the management methods needed to retain certain desirable tree species in forested landscapes;
- Monitor and control of invasive plants. Some areas may be managed by having various friend's groups "adopt" sections of the forest (trails can be used to segment the area). The volunteers would need to learn to identify the "good" and "bad" plants and pull or cut the invasive ones on a regular basis (like sponsored highway clean up segments).
- In stand 3 specifically, reforestation via tree planting will occur. The tree species planted will be native species adapted to the site. The species mix that will be planted may include up to 10% composition of native Wisconsin conifers such as white pine or spruce.
- In stand 3, follow-up maintenance of the newly planted trees may include installing tree protection from animal herbivory, weed control and supplemental tree planting if needed due to mortality.
- Demonstrate wood utilization opportunities using the harvested trees.
- Sugar maple tapping and maple syrup preparation is a demonstration opportunity for spring field trips for local schools. A small boiling shelter could be constructed, and firewood from the property could be used for boiling the sap.
- Locate and protect the ephemeral pond in the woodland, and study the use of the pond and surrounding area by various wildlife species.

3. Current and Planned Facilities or Infrastructure

Type of Facility	Planned or Current	Total (number/length)	Management Activities	Management Issues and Constraints
DOT site usage	current	n/a	Store and process road construction materials for nearby road projects (not on site)	Targeted to complete in 2018
Meeting room or classroom, office for staff, restrooms	planned	1		Depending on organizational fundraising capacity.
Parking for cars and buses	planned	See FEC Green Infrastructure Plan (SmithGroupJJR, 2017)		Waiting DOT project completion
Main Entrance Road	current/ planned	See FEC Green Infrastructure Plan (SmithGroupJJR, 2017)		Waiting DOT project completion
Trails proposed: <u>Accessible:</u> <u>Primitive:</u>	 <u>planned</u> current: reduced to:	 <u>1 loop</u> <u>~ 0.7 miles</u> ~3.9 miles ~0.4 miles	The plan is to have the accessible trail developed and to close a number of volunteer trails that have organically developed.	Target to complete trail work is no later than Fall of 2019.

Other On-going Management Activities (add additional items as necessary)

Stand Number	Current Management Actions	Management Issues and Constraints
3	Spring 2017 and 2018 tree planting	Potential deer browse of newly planted seedlings, weed management issues
1-4	2017 Trail installation	Trail will meet the requirements for access for all abilities.
1-5	Developed action plan every 2 years with FEC board-based on the state fiscal year.	Approach is to implement educational, small scale projects to enhance public awareness of forests and all its components. The first 2-year plan will be developed soon after approval of this plan summer 2017

MAP ATTACHMENTS:

MAP A: Regional Locator

MAP B-1: DNR and Other Lands, Infrastructure

MAP B-2: Proposed Infrastructure

MAP B-3: Existing Land Cover (based on WiscLAND, 1992)

MAP B-4: Stand Delineation: Forested and Non-Forested Areas

References:

SmithGroupJJR and Uihlein Wilson Architects. January, 2017. *The Forest Exploration Center green infrastructure plan*. SmithGroupJJR, 2017, Madison.

Wisconsin Department of Natural Resources. 2015. *The ecological landscapes of Wisconsin: an assessment of ecological resources and a guide to planning sustainable management*. Chapter 19, Southern Lake Michigan Coastal Ecological Landscape. Wisconsin Department of Natural Resources, PUB-SS-1131U 2015, Madison.